Downloading the Emulex Driver for NetWare

Version 2.10c

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Driver Information

Prerequisites

- NetWare 6.0 with Support Pack 2 (SP2) or Support Pack 3 (SP3) and NW56UP2 and NW6NSS2D patches.

> **Note** If you are running Netware 6.0 with Support Pack 3 (SP3), do not use the Mirroring Agent.

- NetWare 5.1 with Support Pack 4 (SP4) and NW56UP1 patch.
- Netware 5.0 with Support Pack 6a.
- NetWare 4.2 is not supported by this driver; use Emulex driver version 1.23c to support NetWare 4.2.

Compatibility

- Emulex Fibre Channel adapters LP10000DC, LP10000 and LP1050 (minimum firmware version 1.80a1)
- Emulex Fibre Channel adapter LP9802DC (minimum firmware version 1.00a4)
- Emulex Fibre Channel adapters LP982 and LP9802 (minimum firmware version 1.00a2)
- Emulex Fibre Channel adapters LP9402DC, LP9002DC, LP9002L, LP9000 & LP952L (minimum recommended firmware version 3.90a7)
- Emulex Fibre Channel adapters LP8000, LP8000DC and LP850
    - ♦ Ifyour HBA has a Dragonfly chip version 2.00 or greater, use firmware version 3.90a7.
    - ♦ If your HBA has a Dragonfly chip below version 2.00, use firmware version 3.30a7.
- Emulex Fibre Channel adapter LP7000E (minimum firmware version 3.21a0)
- Suitable target hardware; lpfc.ham complies with ANSI−T11 SAN protocols for switched fabrics and arbitrated loops.
- Driver version 2.10c does not support NetWare 4.2. For Netware 4.2, use Emulex driver version 1.23c.

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Things to Know Before You Download

- Before you download, create a temporary directory for the Netware driver kit.
- NetWare files may be installed on a Fibre Channel disk provided a local boot disk with DOS exists.

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Changes and Corrections

- The driver supports up to sixteen adapter channels using single or dual channel host bus adapters. In version 2.03c, the driver supported four channels.
- The driver supports failover and failback operations when used in conjunction with EMC's PowerPath
- The driver supports SCSISAN.CDM (custom device module) host adapter control blocks (HACBs).
- The driver supports new targets occupying old D_IDs. The new targets are assigned new SCSI_IDs. Support is also enhanced for old targets occupying new D_IDs.
- The driver has enhanced support for "private" devices.
- A newly established internal table of error policies controls how the driver handles errors: some are retried indefinitely, and some are retried a finite number of times.
- The driver handles result codes from NBI.NLM 2.35.10 (2.35j).
- The driver handles inbound PRLO, RNID and PDISC frames.
- If you set a driver parameter to an incorrect value, an error message is displayed.
- The driver uses RNN_ID and RSNN_NN frames in a fabric environment.
- Link events are handled to ensure a smooth recovery of FCP activity.
- The string length in an RSNN response is correct.
- The driver has enhanced its handling of switch probe ports.
- The driver operates efficiently in FC−AL configurations with frequent loop initializations.
- The driver supports HAM−RETURN_PORT_INFO commands.
- The driver features enhanced support for AEN commands.

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Known Issues

- A small percentage of unload attempts of a single adapter may cause a mirrored partition supported by another adapter to be dismounted.
- If you update the firmware on an LP9820DC HBA, use lp6dutil version 9.0a13 or later.

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Files Included in this Release

This kit includes the following files.

File Name	Description
readme.txt	Release notes for Netware Version 2.10c
lpfc.ham	Emulex Fibre Channel adapter HAM driver
lpfc.ddi	Driver description file

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Verifying Dragonfly Chip Version

There are three methods for determining the Dragonfly chip version: Looking at the Host Bus Adapter, running the DOS utility, or running the UNIX-based utility.

Looking at the Host Bus Adapter

The Dragonfly version number can be found on the top of the large chip, usually after the term "DRAGONFLY" or "DFLY".

Running the DOS Utility

1. Boot up the computer in DOS.
2. Enter this command to start the lp6dutil program.

```
c:\>lp6dutil
```

   The lp6dutil program runs preliminary tests on all host adapters.

3. Press the Return or Enter key until the main menu is displayed. The lp6dutilutility resets all host adapters and resource information for all host bus adapters is displayed.

Note Press 0 to go back to the previous screen.

```
1 - Test Host Adapters
2 - Modify Test Options
3 - Restart Host Adapters
4 - Input/Output
5 - Maintenance
6 - Show Host Adapters Info
7 - Quit
```

4. Select 6, Show Host Adapter Info.

   The Option menu is displayed.

```
1 - BIU PCI Configuration Parameters     5 - Service Parameters
2 - Host Adapter Info and Status         6 - Status/Counters Info
3 - Adapter Revision Levels              7 - Link Status
4 - Display Configuration Data           8 - Link Attention
```

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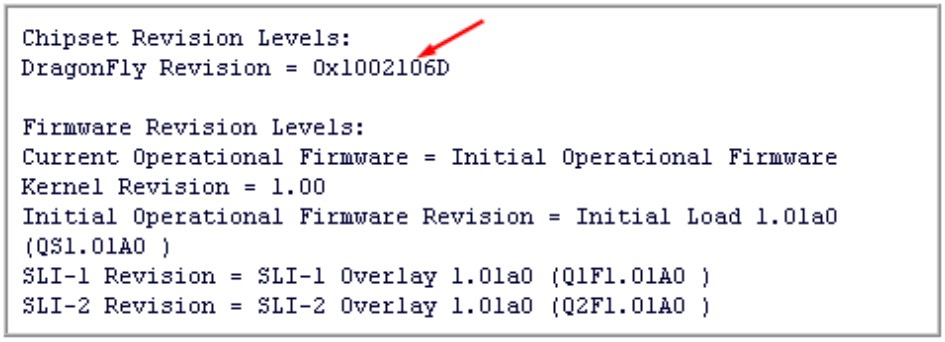
5. Select 3, Adapter Revision Levels . If there are multiple host adapters, specify a list of numbers from 1 – 3 separated by spaces, or use a '–' between two numbers to specify a range of host adapters. The following type of information is displayed for the host bus adapter (this is an example only).


Chipset Revision Levels:
DragonFly Revision = 0x1002106D
Firmware Revision Levels:
Current Operational Firmware = Initial Operational Firmware
Kernel Revision = 1.00
Initial Operational Firmware Revision = Initial Load 1.01a0
(QS1.01A0)
SLI-1 Revision = SLI-1 Overlay 1.01a0 (Q1F1.01A0)
SLI-2 Revision = SLI-2 Overlay 1.01a0 (Q2F1.01A0)

Version 1 shows a chipset revision that contains 210 near the end of the adapter's hex number (DragonFly Revision number).

Version 2 shows a chipset revision that contains 250 near the end of the adapter's hex number.

Using the UNIX−based Utility

1. Enter the appropriate command to start the lputil utility:

For AIX enter: /usr/lpp/diagnostics/lputil
For HP-UX enter: /opt/lpfc/bin/lputil
For Linux enter: /usr/sbin/lpfc/lputil
For Solaris PCI bus enter:/usr/sbin/lpfc/lputil

The main menu is displayed.

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```
LightPulse Common Utility version 1.1  (3/17/99)
Copyright (c) 1999, Emulex Network Systems, Inc.

Emulex Fibre Channel Host Adapters Detected: 1
Host Adapter 0 is an LP7K (Ready Mode)

MAIN MENU

 1. List Adapters
 2. Adapter Information
 3. Firmware Maintenance
 4. Reset Adapter

 0. Exit

Enter Choice =>
```

2. Select 2, Adapter Information. The Adapter Information Menu is displayed.

```
1. BIU PCI Configuration Parameters
2. Adapter Revision Levels
3. Wakeup Parameters
4. IEEE Address
5. Loop Map
6. Status & Counters
7. Link Status
8. Configuration Parameters


0. Return to Main Menu.
```

3. Select 2, Adapter Revision Levels. If there are multiple host adapters, a list is displayed and you need to select an adapter. The following type of information is displayed for the host bus adapter (this is an example only).

```
BIU: 2002506D
Sequence Manager: 00000000
Endec: 00000000
Operational Firmware: SLI-2 Overlay
   Kernel: LP8K 2.01a0
Initial Firmware: Initial Load 3.81a2 (DS3.81A2)
   SLI-1:LP8K SLI-1 Overlay 3.81a2 (DID3.81A2)
   SLI-2:LP8K SLI-2 Overlay 2.81a2 (D2D3.81A2)
Highest FC-PH Version: 4.3
Lowest FC-PH Version:4.3

Press any key to continue.
```

Version 1 shows a chipset revision that contains 210 near the end of the BIU number.
Version 2 shows a chipset revision that contains 250 near the end of the BIU number.

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Installing the Emulex Driver for NetWare

Version 2.10c

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Install Driver on Existing Netware Server

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Install Driver on a New NetWare Server

NetWare files may be installed on a Fibre Channel disk provided a boot disk with DOS exists.

1. Follow the standard Novell installation instructions.
2. When prompted for "Disk drivers", press <Insert> to install an unlisted driver.
3. Press <F3> to specify the driver directory path, for example A:\

4. Select the Emulex driver lpfc.ham and continue with the standard Novell installation procedure.
5. The driver may also be pre−loaded in C:\NWUPDATE. See Novell Technical Information Document 2950728.

For most applications, all driver options should be left in default mode. When attaching the driver to an array, the /LUN option must be set and a MAX_LUN value must be set depending upon the array configuration.

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Install Driver on an Existing NetWare Server

At the server console:

1. Load the install program by entering the following command:

```
LOAD NWCONFIG
```

2. Select "Driver Options".
3. Select "Configure disk and storage device drivers".
4. Select "Select an additional driver".
5. Press <Insert> to install a driver that is not on the list.
6. Press <F3> to specify the path for the new driver (enter "A:\" if the files are saved on a floppy disk).
7. Select the Emulex lpfc.ham driver and copy the driver files to the server directory.
8. The driver may also be pre−loaded in C:\NWUPDATE. See Novell Technical Information Document 2950728.

For most applications, all driver options should be left in default mode. When attaching the driver to an array, the /LUN option must be set and a MAX_LUN value must be set depending upon the array configuration.

The NetWare device driver installation is complete.

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Configuring the Emulex Driver for NetWare

Version 2.10c

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- Driver Parameters
- Special Command Line Parameters

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Introduction

Options in the following Driver Parameter and Special Command Line Parameter pages can be configured to "fine tune" the Emulex SCSI/IP device driver for NetWare.

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Driver Parameters

ALPA (Arbitrated Loop Port Address)

This parameter selects the AL_PA that the adapter requests during the loop initialization. The AL_PA selected has to be a valid value; the default of 17 (hex) is compatible with previous drivers. The following is the list of all possible AL_PAs. FC disks typically use values at the high end of the list, and host adapters at the low end.

0x01	0x02	0x04	0x08	0x0F	0x10	0x17	0x18	0x1B
0x1D	0x1E	0x1F	0x23	0x25	0x26	0x27	0x29	0x2A
0x2B	0x2C	0x2D	0x2E	0x31	0x32	0x33	0x34	0x35
0x36	0x39	0x3A	0x3C	0x43	0x45	0x46	0x47	0x49
0x4A	0x4B	0x4C	0x4D	0x4E	0x51	0x52	0x53	0x54
0x55	0x56	0x59	0x5A	0x5C	0x63	0x65	0x66	0x67
0x69	0x6A	0x6B	0x6C	0x6D	0x6E	0x71	0x72	0x73
0x74	0x75	0x76	0x79	0x7A	0x7C	0x80	0x81	0x82
0x84	0x88	0x8F	0x90	0x97	0x98	0x9B	0x9D	0x9E
0x9F	0xA3	0xA5	0xA6	0xA7	0xA9	0xAA	0xAB	0xAC
0xAD	0xAE	0xB1	0xB2	0xB3	0xB4	0xB5	0xB6	0xB9
0xBA	0xBC	0xC3	0xC5	0xC6	0xC7	0xC9	0xCA	0xCB
0xCC	0xCD	0xCE	0xD1	0xD2	0xD3	0xD4	0xD5	0xD6
0xD9	0xDA	0xDC	0xE0	0xE1	0xE2	0xE4	0xE8	0xEF

HARD_ADDRESS_MODE

Boolean parameter: 0 = not selected, 1 = selected. Default is HARD_ADDRESS_MODE = 0;

If HARD_ADDRESS_MODE is not selected (the default), whenever devices are discovered/rediscovered (such as after cable disconnect/connect or drive removal/insertion) the World Wide Port Name and the World Wide Node Name of the device are compared to verify that the same device is present as was previously there. If HARD_ADDRESS_MODE is selected, no checking is performed to verify that a device discovered at one Fibre Channel address is the same as the one previously found there. HARD_ADDRESS_MODE is used for certain dual−channel RAID arrays where you do not have the option of retaining the World Wide Port Name and the World Wide Node Name of the controller when replacing the controller. Using it for any other situation may cause I/O to be sent to the new device when it shouldn't be.

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LINK_DOWN_TOUT

Minimum value = 0, maximum value = 65536 (decimal). Default = 60;

This parameter specifies the maximum time, in seconds, for a link to remain down prior to beginning to return I/O requests in error. Use a value of zero to never timeout I/O requests when the link is down. Events such as cable disconnects can cause the link to be down indefinitely. Events such as drive removal/insertion only cause the link to be down only briefly. The default value should be satisfactory for most cases.

/LUN

Boolean parameter: 0 = off, 1 = on. Default is /LUN=0;

If this parameter is turned off (default), access is restricted to LUN 0 of any multi−LUN device. When this parameter is turned on, multi−LUN support for the Emulex LightPulse PCI Fibre Channel Adapter driver is activated. See MAX_LUN below.

MAX_LUN

Minimum value = 1, maximum value = 256 (decimal). Default = 8;

MAX_LUN determines the number of LUNs supported per device. This is important for RAID arrays. This value is required if /LUN is set to 1 (turned on). The value is dependent on the array configuration.

MAX_QDEPTH

Minimum value = 1, maximum value = 64 (decimal). Default = 16;

MAX_QDEPTH controls the number of commands that can be issued at one time to each LUN before automatic throttling occurs. The default value should be satisfactory for most cases.

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NUMBDES

Minimum value = 2000, maximum value = 5000 (decimal). Default = 4000;

This parameter allows resources to be tuned for the number of devices. Each BDE resource consumes 12 bytes of memory. The default value should be satisfactory for most cases.

NUMDEVICES

Minimum value = 0, maximum value = 1000 (decimal). Default = 400;

NUMDEVICES specifies the maximum number of target devices that might be connected to the fabric. The default value should be satisfactory for most cases.

NOTE: To allow for loop operations, 126 additional devices are always enabled.

N_TIMEOUT

Minimum value = 0, maximum value = 300 (decimal). Default = 20;

Node timeout controls a "second chance" for a "disappearing" device. After events such as cable disconnect/reconnect or drive removal/insertion, the driver checks what devices it has found. If that list does not include a previously found device, and this value is not 0, the driver waits the specified number of seconds and then restarts the checking. If the device is found on the second try, then the device is considered to be available; if it is still not found, the driver will reject any further attempts to access it. The default value should be satisfactory for most cases. CLARiiON RAID arrays may require setting the value to 90.

RSCNADISC

Boolean parameter: 0 = not selected, 1 = selected. Default is RSCNADISC=1;

RSCNADISC is used in link error recovery situations. When set to 1 (default), the system uses ADISC when possible to rediscover a node. If set to 0, only PLOGI is used.

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RSCNDELAY

Minimum value = 0, maximum value = 60 (decimal). Default = 0;

RSCNDELAY specifies the time, in seconds, to delay a query to the Fibre Channel Name Server after a State Change Notification. The default value should be satisfactory for most cases.

RSCNZONE

Boolean parameter: 0 = not selected, 1 = selected. Default is RSCNZONE=1;

If set to 1 (default), always query the Fibre Channel Name Server after a State Change Notification. If set to 0, query only when necessary.

SCANDOWN

Boolean parameter: 0 assigns to each device in the loop a fixed SCSI ID in the range of 0 to 125. 1 assigns to each device in the loop a fixed SCSI ID in the range of 125 to 0. This parameter applies ONLY to private loop configurations.

Scan Direction for Loop Auto Binding:

When SCANDOWN=0, this option assigns to each device in the loop a fixed SCSI ID in the range 0 to 125, in increasing order depending on the AL_PA of the device. For instance, the device at AL_PA 1 will always have the SCSI ID x01, and the device at AL_PA xEF will always have the SCSI ID 125. This is the default, and matches the behavior of earlier drivers.

When SCANDOWN=1, this option assigns to each device in the loop a fixed SCSI ID in the range 125 to 0 , in decreasing order depending on the AL_PA of the device. For instance, the device at AL_PA xEF will always have the SCSI ID 0, and the device at AL_PA x01 will always have the SCSI ID 125.

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DELAY_TOUT

Minimum value = 0, maximum value = 500 (decimal). Default = 0;

This parameter specifies a delay period to extend the timeout value of operations (such as read or write to a target device). This allows, for instance, an adjustment in timeouts when large fabrics or WAN−connected fabrics may add delays to normal response times. The default value is appropriate for most environments, and care should be used in choosing any non−zero value.

LINK_SPEED

Minimum value = 0, maximum value = 2. Default = 0;

This parameter controls the setting of the Fibre Channel link speed in HBAs capable of 2 Gbps link speeds. The value 0 selects auto−negotiate; the HBA attempts to match the link speed of the other devices on the link. The value 1 forces the HBA to use 1 Gbps link speed. The value 2 forces the HBA to use 2 Gbps link speed. The default value of 0 is appropriate for most environments.

TOPOLOGY

Accepted values = 0, 1, 2, or 3. Default = 2;

Topology specifies the type of link to be supported.
0 to specify loop topology,
1 to specify point−to−point topology (including switched fabric),
2 to attempt to use loop first, then point−to−point if loop is not found,
3 to attempt to point−to−point first, then loop if point−to−point is not found.

NOTE: If the actual setup is private loop using a hub product (for example, Emulex LH5000) and topology option 3 is used to attempt point−to−point first with fail−over to loop, be sure that the AutoLIP feature (LIP 57 on insert) is enabled.

USEADISC

Boolean parameter: 0 = not selected, 1 = selected. Default is USEADISC=0;.

USEADISC is used in link error recovery situations (link up events). If set to 0 (default), only PLOGI is used. If set to 1, uses ADISC when possible to rediscover a node.

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Special Command Line Parameters

The command line parameters on this page are parsed separately from the rest of the command line parameters. Install−time help information is not available for them.

These parameters are used to control whether certain Fibre Channel devices are included or excluded from the list of devices an adapter recognizes for valid connections. The following descriptions represent hex strings by "xxx...", where each x represents a hex digit.

ACCEPTWWNN –

This parameter configures the driver to recognize a specific device, using the World Wide Node Name for the device as the key to identifying the device. The World Wide Node Name is typically based on the IEEE identification of a specific device. The syntax is

```
ACCEPTWWNN=xxxxxxxxxxxxxxxx
ACCEPTWWNN=xxxxxxxxxxxxxxxx:lun
ACCEPTWWNN=xxxxxxxxxxxxxxxx:luny−lunz
```

The last two forms allow the parameter to refer to a specific LUN or range of LUNs.

When several devices with similar names are to be specified, an asterik (*) may substitute for any number of the digits from the right; only one asterisk is allowed.
For example, ACCEPTWWNN=012345*

ACCEPTWWPN –

This parameter configures the driver to recognize a specific device, using the World Wide Port Name for the device as the key to identifying the device. The World Wide Port Name is typically based on the World Wide Node Name of a specific device. The syntax is

```
ACCEPTWWPN=xxxxxxxxxxxxxxxx
ACCEPTWWPN=xxxxxxxxxxxxxxxx:lun
ACCEPTWWPN=xxxxxxxxxxxxxxxx:luny−lunz
```

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The last two forms allow the parameter to refer to a specific LUN or range of LUNs.

When several devices with similar names are to be specified, an asterik (*) may substitute for any number of the digits from the right; only one asterisk is allowed.
For example, ACCEPTWWPN=012345*.

ACCEPTDID –

This parameter configures the driver to recognize a specific device, using the Fibre Channel device ID for the device as the key to identifying the device. The Fibre Channel device ID is determined by fabric and/or loop considerations, and may change if the physical connection is moved or if there is a change in participating vs. non−participating devices, or other configuration changes occur. The syntax is

ACCEPTDID=xxxxxx
ACCEPTDID=xxxxxx:lun
ACCEPTDID=xxxxxx:luny−lunz

The last two forms allow the parameter to refer to a specific LUN or range of LUNs.

When several devices with similar names are to be specified, an asterik (*) may substitute for any number of the digits from the right; only one asterisk is allowed.
For example, ACCEPTDID=012345*.

BINDWWNN –

This parameter configures the driver to recognize a specific device with a specific SCSI ID used to identify it to the system, using the World Wide Node Name for the device as the key to identifying the device.

The syntax is BINDWWNN=xxxxxxxxxxxxxxxx:yy

where yy is the desired SCSI ID.

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BINDWWPN –

This parameter configures the driver to recognize a specific device with a specific SCSI ID used to identify it to the system, using the World Wide Port Name for the device as the key to identifying the device.

The syntax is BINDWWPN=xxxxxxxxxxxxxxxx:yy

where yy is the desired SCSI ID.

BINDDID –

This parameter configures the driver to recognize a specific device with a specific SCSI ID used to identify it to the system, using a DID (a Fibre Channel address) for the device as the key to identifying the device.

The syntax is BINDDID=xxxxxx:yy

where yy is the desired SCSI ID.

REJECTWWNN –

This parameter configures the driver to ignore a specific device, using the World Wide Node Name for the device as the key to identifying the device. The World Wide Node Name is typically based on the IEEE identification of a specific device. The syntax is

REJECTWWNN=xxxxxxxxxxxxxxxx
REJECTWWNN=xxxxxxxxxxxxxxxx:lun
REJECTWWNN=xxxxxxxxxxxxxxxx:luny−lunz

The last two forms allow the parameter to refer to a specific LUN or range of LUNs.

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REJECTWWPN –

This parameter configures the driver to ignore a specific device, using the World Wide Port Name for the device as the key to identifying the device. The World Wide Port Name is typically based on the World Wide Node Name of a specific device. The syntax is

REJECTWWPN=xxxxxxxxxxxxxxxx
REJECTWWPN=xxxxxxxxxxxxxxxx:lun
REJECTWWPN=xxxxxxxxxxxxxxxx:luny−lunz

The last two forms allow the parameter to refer to a specific LUN or range of LUNs.

REJECTDID –

This parameter configures the driver to ignore a specific device, using the Fibre Channel device ID for the device as the key to identifying the device. The Fibre Channel device ID is determined by fabric and/or loop considerations, and may change if the physical connection is moved or if there is a change in participating vs. non−participating devices, or other configuration changes occur. The syntax is

REJECTDID=xxxxxx
REJECTDID=xxxxxx:lun
REJECTDID=xxxxxx:luny−lunz

The last two forms allow the parameter to refer to a specific LUN or range of LUNs.

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